

## STEAM IRON

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

5 The present invention relates to steam irons and, more particularly, to such a steam iron, which prevents reverse flow of steam to the water tank through the water supply pipe of the water tank, and automatically discharges steam when the internal pressure of the boiler is excessively high.

#### 2. Description of the Related Art

10 A regular steam iron generally comprises a housing, a water tank, and a boiler. The water tank is mounted in the housing and adapted to supply water to the boiler through a water supply pipe. The boiler is adapted to boil water into steam. This structure of steam iron is still not satisfactory in function. When the internal pressure of the boiler is excessively high, hot water (steam) will reversely pass through the 15 water supply pipe to the water tank, increasing the internal pressure of the water tank and stopping the supply of water from the water tank to the boiler. The boiler may keep burning when dried. Burning dry may cause the boiler to burn out or to break the circuit.

### SUMMARY OF THE INVENTION

20 It is therefore the main objective of the present invention to provide a steam iron, which prevents reverse flow of steam from the boiler to the water tank through the water supply pipe of the water tank.

It is another objective of the present invention to provide a steam iron, which 25 automatically discharges steam from the boiler when the internal pressure of the boiler surpassed a predetermined level.

To achieve the above-mentioned objectives, the steam iron provided by the present invention comprises a housing having a receiving chamber therein, a water tank mounted in the receiving chamber and having a tank body for storing water and a water supply pipe extended from the tank body, a boiler mounted in said receiving chamber and having a boiler body connected to the water supply pipe for receiving water from the tank body and boiling water into steam and a relief pipe having an end connected to the boiler body and an opposite end connected to the tank body, a one-way check valve and a relief valve. The one-way check valve has a casing mounted in the water supply pipe and a valve flap movable in the casing of the one-way check valve between an open position and a close position. The valve flap is moved to the open position for enabling cold water to pass from the tank body to the boiler body when an internal pressure of the boiler body is within a predetermined level. The valve flap is moved to the close position by the internal pressure of the boiler body when the internal pressure of the boiler body surpassed the predetermined level. The relief valve has a casing mounted in the relief pipe and a piston mounted in the casing of the relief valve and movable between an open position and a close position to control passage of the relief pipe. The piston is moved to the open position for enabling steam to pass from the boiler body to the tank body when the internal pressure of the boiler body surpassed the predetermined level. The piston is moved to the close position by water from the tank body to stop the passage of the relief pipe when the internal pressure of the boiler body is below the predetermined level.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a schematic drawing of a steam iron according to the present invention.

FIG. 2 is a perspective view of a one-way check valve for the steam iron

according to the present invention.

FIG. 3 is an exploded, partially sectional view of the one-way check valve shown in FIG. 2.

FIG. 4 is an exploded, partially sectional view of a relief valve for the steam 5 iron according to the present invention.

FIG. 5 is a schematic sectional view showing the open status of the one-way check valve according to the present invention.

FIG. 6 is a schematic sectional view showing the close status of the one-way check valve according to the present invention.

10 FIG. 7 is a schematic sectional view showing the close status of the relief valve according to the present invention.

FIG. 8 is a schematic sectional view showing the open status of the relief valve according to the present invention.

#### **DETAILED DESCRIPTION OF THE INVENTION**

15 Referring to FIGS. 1~8, a steam iron 100 in accordance with a preferred embodiment of the present invention is shown comprising a housing 10, a water tank 20, a boiler 30, a one-way check valve 40, and a high-pressure relief valve 50.

The housing 10 defines therein a receiving chamber 11, which accommodates the water tank 20, the boiler 30, the one-way check valve 40, and the 20 relief valve 50.

The water tank 20 comprises a tank body 21 fixedly mounted inside the receiving chamber 11 of the housing 10 at one side, and a water supply tube 22 extended from the bottom side of the tank body 21 to the boiler 30.

The boiler 30 comprises a boiler body 31 and a relief pipe 32. The boiler 25 body 31 is mounted inside the receiving chamber 11 of the housing 10 and connected

to one end of the water supply tube 22 for receiving water from the water tank 20. The boiler 30 uses externally supplied electric energy to heat water into steam. The relief pipe 32 has one end connected to the boiler body 31, and the other end connected to the tank body 21.

5        The one-way check valve 40 is mounted in the water supply pipe 22 of the water tank 20 on the middle to guide water from the tank body 21 to the boiler 30, and to prevent reverse flow of water from the boiler 30 to the tank body 21. The one-way check valve 40 comprises a casing 41, a flow guide 42, and a valve flap 43. The casing 41 is a tubular member, comprising a water inlet 411 disposed at one end, a flow guide hole 413 disposed at the other end, and an actuation chamber 412 axially connected between the water inlet 411 and the flow guide hole 413. The water inlet 411 extends axially inwardly from one end of the casing 41 to a predetermined distance. The flow guide hole 413 extends axially inwardly from the other end of the casing 41 to a predetermined distance. The actuation chamber 412 is in fluid communication between the water inlet 411 and the flow guide hole 413. The actuation chamber 412 has an inner diameter greater than the water inlet 411 but smaller than the flow guide hole 413. The flow guide 42 is a tubular member having an outer diameter equal to the inner diameter of the flow guide hole 413. The two distal ends of the flow guide 42 are open ends. A grille 421 is provided at one end of the flow guide 42. The flow guide 42 is fitted into the flow guide hole 413 of the casing 41, keeping the grille 421 stopped at the stepped connection area between the actuation chamber 412 and the flow guide hole 413. The valve flap 43 is a disk-like member having a flap body 431 and a plurality of protruding stop portion 432 radially extended from the periphery of the valve flap body 431 and spaced from one another at distance. The diameter of the 10      valve flap body 431 is greater than the water inlet 411. The valve flap 43 is mounted in

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actuation chamber 412, keeping the outer ends of the protruding stop portion 432 disposed in lightly contact with the peripheral wall of the actuation chamber 412.

The relief valve 50 is mounted in the relief pipe 32 of the boiler 30 on the middle, and adapted to release excessive high steam pressure from the boiler body 31.

- 5 The relief valve 50 comprises a casing 51, and a piston 52. The casing 51 is a tubular member directly mounted in the relief pipe 32 on the middle, comprising a transversely extended stop wall 511, a center through hole 512 cut through the center of the stop wall 511, and a plurality of relief holes 513 cut through the stop wall 511 around the center through hole 512. The piston 52 is molded from elastic material, for example, 10 rubber, comprising a piston rod 522 inserted through the center through hole 512 of the stop wall 511 of the casing 51, a piston head 521 provided at one end of the piston rod 522 and disposed at one side relative to the stop wall 511, and a stop flange 523 extended around the periphery of the piston rod 522 and disposed at the other side relative to the stop wall 511. The piston head 521 has a flat sealing face 524 adapted to 15 seal the center through hole 512 and the relief holes 513, i.e., the area of the sealing face 524 of the piston head 521 is greater than the area covering the center through hole 512 and the relief holes 513. The outer diameter of the stop flange 523 is greater than the diameter of the center through hole 512.

After description of the parts of the steam iron 100 and their assembly 20 procedure, the operation of the steam iron 100 is outlined hereinafter.

When the tank body 21 of the water tank 20 started to supply cold water W to the boiler body 31 of the boiler 30, cold water W is guided by the water supply pipe 22 to the one-way check valve 40 to push the valve flap 43 away from the water inlet 411 to the grille 421 of the flow guide 42 and then to flow through the open spaces in 25 the grille 421 to the inside of the flow guide 42 (see FIG. 5) and then to the inside of

the boiler body 31 for boiling into steam. When the internal pressure of the boiler body 31 surpassed a predetermined value, steam **P** will flow back to the inside of the water supply pipe 22 to push the valve flap 43 away from the grille 421 toward the water inlet 411, thereby causing the valve flap 43 to seal the water inlet 411, and therefore 5 steam **P** is prohibited from returning to the tank body 21 through the water supply pipe 22 (see FIG. 6). At this time, steam **P** will flow to the relief pipe 32 to push the piston head 521 of the piston 52 away from the stop wall 511 and then to flow through the relief holes 513 to the inside of the tank body 21 (see FIG. 8), enabling the internal pressure of the boiler body 31 to be released.

10 Further, because steam **P** can be released from the boiler body 31 to the tank body 21 through the relief valve 50, cold water **W** can be continuously supplied from the tank body 21 to the boiler body 31, preventing burning of the boiler body 31.

If the steam pressure of the boiler body 31 is normal, the piston head 521 will be forced by cold water **W** from the container body 21 to the stop wall 511, 15 causing the sealing face 524 to seal the center through hole 512 and the relief holes 513 (see FIG. 7) to stop cold water **W** from passing to the boiler body 31 through the relief pipe 32. If the internal pressure of the boiler body 31 is normal, steam pressure is insufficient to push the piston head 521 away from the stop wall 511, and therefore steam is prohibited from passing through the relief valve 50 to the tank body 21.

20 Further, because the relief holes 513 of the casing 51 of the relief valve 50 have a suitable diameter, releasing steam pressure does not cause a big amount of steam to flow to the inside of the tank body 21.

As indicated above, the steam iron uses a one-way check valve and a relief valve to control the internal pressure of the boiler body within a safety range, for 25 enabling cold water to be continuously supplied to the boiler body to prevent burning

dry.

Although a particular embodiment of the present invention has been shown and described, it will be understood that various modifications and changes could be made thereunto without departing from the spirit and scope of the invention.